CLAIMS

What is claimed is:

1. A variable capacity rotary compressor, comprising:

upper and lower compression chambers having different interior capacities thereof;

a rotating shaft passing through the upper and lower compression chambers;

upper and lower eccentric cams provided on the rotating shaft;

upper and lower eccentric bushes fitted over the upper and lower eccentric cams, respectively;

a slot provided at a first predetermined position between the upper and lower eccentric bushes;

a locking pin to change a position of the upper or lower eccentric bush to a maximum eccentric position, in cooperation with the slot; and

upper and lower brake units simultaneously operated to prevent either of the upper and lower eccentric bushes from slipping over the upper eccentric cam or the lower eccentric cam, respectively.

2. The rotary compressor according to claim 1, wherein

the upper brake unit comprises:

first and second upper pockets formed at second predetermined positions of the upper eccentric cam,

first and second upper brake balls movably set in the first and second upper pockets, respectively, and

first and second upper brake holes formed at third predetermined positions of the upper eccentric bush such that the first and second upper brake holes have diameters smaller than those of the first and second upper brake balls, respectively; and

the lower brake unit comprises:

first and second lower pockets formed at fourth predetermined positions of the lower eccentric cam,

first and second lower brake balls movably set in the first and second lower pockets, respectively, and

first and second lower brake holes formed at fifth predetermined positions of the lower eccentric bush such that the first and second lower brake holes have diameters smaller than those of the first and second lower brake balls, respectively.

3. The rotary compressor according to claim 2, wherein the locking pin projects from the rotating shaft at a position between the upper and lower eccentric cams, and the slot is provided between the upper and lower eccentric bushes to engage with the locking pin, and has a length to allow, an angle between a first line extending from a first end of the slot to a center of the rotating shaft and a second line extending from a second end of the slot to the center of the rotating shaft, to be 180°.

4. The rotary compressor according to claim 3, wherein the first and second upper pockets are formed on the upper eccentric cam to be opposite to each other, and the first and second lower pockets are formed on the lower eccentric cam to be opposite to each other at common angular positions as those of the first and second upper pockets.

5. The rotary compressor according to claim 4, wherein the first and second upper brake holes are formed on the upper eccentric bush to be opposite to each other, and the first and second lower brake holes are formed on the lower eccentric bush to be opposite to each other at common angular positions as those of the first and second upper brake holes.

6. The rotary compressor according to claim 5, wherein, when the locking pin contacts the first end of the slot and the upper eccentric bush rotates to be maximally eccentrically from the rotating shaft, the first and second upper brake balls are inserted into the first and second upper brake holes, respectively, and the first and second lower brake balls are inserted into the first and second lower brakes holes, respectively, by a centrifugal force to prevent the upper eccentric bush from slipping.

7. The rotary compressor according to claim 5, wherein, when the locking pin contacts the second end of the slot and the lower eccentric bush rotates to be maximally eccentrically from the rotating shaft, the first and second upper brake balls are inserted into the second and first upper brake holes, respectively, and the first and second lower brake balls are inserted into the second and first lower brakes holes, respectively, by a centrifugal force to prevent the lower eccentric bush from slipping.

8. The rotary compressor according to claim 5, further comprising:

an oil passage axially formed along the rotating shaft;

first and second upper connecting passages, the first and second upper pockets communicate with the oil passage via the first and second upper connecting passages; and

first and second lower connecting passages, the first and second lower pockets communicate with the oil passage via the first and second lower connecting passages to allow an oil pressure and the centrifugal force to act on the first and second upper brake balls and the first and second lower brake balls.

9. A variable capacity rotary compressor, comprising:

upper and lower compression chambers having different interior capacities thereof;

a rotating shaft passing through the upper and lower compression chambers;

upper and lower eccentric cams provided on the rotating shaft to be eccentric from the rotating shaft in a common direction;

upper and lower eccentric bushes fitted over the upper and lower eccentric cams, respectively, to be eccentric from the rotating shaft in opposite directions;

a slot provided at a first predetermined position between the upper and lower eccentric bushes, and having first and second ends thereof;

a locking pin to contact either the first end or the second end of the slot, according to a rotating direction of the rotating shaft, to change a position of the upper eccentric bush or the lower eccentric bush to a maximum eccentric position; and

upper and lower brake units simultaneously operated to prevent either of the upper and lower eccentric bushes from slipping over the upper eccentric cam or the lower eccentric cam, respectively.

10. The rotary compressor according to claim 9, wherein

the upper brake unit comprises:

first and second upper pockets formed at second predetermined positions of the upper eccentric cam,

first and second upper brake balls movably set in the first and second upper pockets, respectively, and

first and second upper brake holes formed at the upper eccentric bush and having diameter smaller than that of each of the first and second upper brake balls; and

the lower brake unit comprises:

first and second lower pockets formed at fourth predetermined positions of the lower eccentric cam,

first and second lower brake balls movably set in the first and second lower pockets, respectively, and

first and second lower brake holes formed at fifth predetermined positions of the lower eccentric bush to have a diameter smaller than that of each of the first and second lower brake balls.

11. The rotary compressor according to claim 10, wherein the first and second upper pockets are formed on the upper eccentric cam to be opposite to each other, and the first and second lower pockets are formed on the lower eccentric cam to be opposite to each other at common angular positions as those of the first and second upper pockets.

12. The rotary compressor according to claim 11, wherein the first and second upper brake holes are formed on the upper eccentric bush to be opposite to each other, and the first and second lower brake holes are formed on the lower eccentric bush to be opposite to each other at common angular positions as those of the first and second upper brake holes.

13. The rotary compressor according to claim 12, further comprising:

an oil passage axially formed along the rotating shaft;

first and second upper connecting passages, the first and second upper pockets communicate with the oil passage via the first and second upper connecting passages; and

first and second lower connecting passages, the first and second lower pockets communicate with the oil passage via the first and second lower connecting passages to allow an oil pressure and the centrifugal force to act on the first and second upper brake balls and the first and second lower brake balls.

14. The rotary compressor according to claim 10, wherein when the locking pin contacts the first end of the slot and the rotating shaft rotates along with the upper and lower eccentric bushes in a first direction, the first upper pocket is aligned with the first upper brake hole and the second upper pocket is aligned with the second upper brake hole such that the first and second upper brake balls are inserted into the first and second upper brake holes, respectively, to prevent the upper eccentric bush from slipping and when the locking pin contacts the second end of the slot and the rotating shaft rotates along with the upper and lower eccentric bushes in a second direction, the first upper pocket is aligned with the second upper brake hole and the second upper pocket is aligned with the first upper brake hole such that the first and second upper brake balls are inserted into the second and first upper brake holes, respectively, to prevent the lower eccentric bush from slipping.

15. A variable capacity rotary compressor having upper and lower compression chambers, comprising:

upper and lower eccentric cams retractably provided in the upper and lower compression chambers, respectively;

upper and lower eccentric bushes fitted over the upper and lower eccentric cams, respectively;

a slot formed between the upper and lower eccentric bushes;

a locking pin to change a position of the upper or lower eccentric bush to a maximum eccentric position, in cooperation with the slot; and

upper and lower brake units operated to prevent one or both of the upper and lower eccentric bushes from slipping with respect to one or both of the upper eccentric cam and the lower eccentric cam, respectively.

16. The rotary compressor according to claim 15, wherein the upper and lower compression chambers have different compression capacities.

17. The rotary compressor according to claim 15, wherein:

the upper brake unit comprises:

first and second upper projectable parts projectable from predetermined positions of the upper eccentric cam, and

first and second upper receiving parts formed in the upper eccentric bush to receive the first and second upper projectable parts when the first and second upper projectable parts are projected; and

the lower brake unit comprises:

first and second lower projectable parts projectable from predetermined positions of the lower eccentric cam, and

first and second lower receiving parts formed in the lower eccentric bush to receive the first and second lower projectable parts when the first and second lower projectable parts are projected.

18. The rotary compressor according to claim 15, wherein the upper and lower compression chambers comprise upper and lower inlet ports, respectively, thereat; the rotary compressor further comprising:

first and second intake paths to supply refrigerant to the upper inlet port of the upper compression chamber and the lower inlet port of the lower compression chamber, respectively; and

a path control unit to open or to close the first or second intake paths and to allow a supply of the refrigerant to only one of the upper inlet port of the upper compression chamber and the lower inlet port of the lower compression chamber such that a compression operation is executed in the refrigerant supplied compression chamber.

19. The rotary compressor according to claim 18, wherein the path control unit comprises:

a valve unit installed in the path control unit to be movable extending in a first direction to open one of the first and second intake paths by a difference in a pressure between the first intake path connected to the upper inlet port and the second intake path connected to the lower inlet port to supply the refrigerant to only one of the upper and lower inlet ports.

20. The rotary compressor according to claim 15, further comprising:

a rotating shaft communicating with the upper and lower eccentric bushes such that when the rotating shaft rotates in a first direction or a second direction, the upper and lower eccentric bushes are not rotated until the locking pin comes into contact with one of first and second ends of the slot and when the locking pin comes into contact with the first end or the second end of the slot, the upper and lower eccentric bushes rotate in the first direction or the second direction along with the rotating shaft.

21. The rotary compressor according to claim 17, further comprising:

a rotating shaft rotating the upper and lower eccentric bushes;

an oil passage formed extending along the rotating shaft; and

a plurality of connecting passages, the first and second upper projectable parts and the first and second lower projectable parts communicating with the oil passage via the plurality of connecting passages to allow an oil pressure and a centrifugal force of the rotating upper and lower eccentric bushes to act on the first and second upper projectable parts and the first and second lower projectable parts to project into respective ones of the first and second upper receiving parts and the first and second lower receiving parts.

22. A variable capacity rotary compressor having upper and lower compression chambers, comprising:

upper and lower eccentric cams rotatably provided in the upper and lower compression chambers, respectively;

upper and lower eccentric bushes fitted over the upper and lower eccentric cams, respectively;

a configuration unit to changeably configure the upper and lower eccentric bushes to provide a compression operation in one of the upper and lower compression chambers and to provide an idle operation in a remaining one of the upper and lower compression chambers; and

upper and lower brake units operated to prevent one or both of the upper and lower eccentric bushes from slipping with respect to one or both of the upper and lower eccentric cams, respectively.

23. A variable capacity rotary compressor having upper and lower compression chambers, comprising:

upper and lower eccentric cams rotatably provided in the upper and lower compression chambers, respectively;

upper and lower eccentric bushes fitted over the upper and lower eccentric cams, respectively, and changeably configured such that a compression operation is provided in one of the upper and lower compression chambers and an idle operation is provided in a remaining one of the upper and lower compression chambers; and

upper and lower brake units operated to prevent one or both of the upper and lower eccentric bushes from slipping with respect to one or both of the upper and lower eccentric cams, respectively.

24. A variable capacity rotary compressor including upper and lower compression chambers having different interior capacities thereof, comprising:

upper and lower eccentric cams rotatably provided in the upper and lower compression chambers, respectively, the upper and lower eccentric cams being eccentric in the upper and lower compression chambers in a common direction;

upper and lower eccentric bushes fitted over the upper and lower eccentric cams, respectively, and being eccentric in the upper and lower compression chambers in opposite directions;

a slot provided between the upper and lower eccentric bushes, and having first and second ends;

a locking pin to change a position of the upper or lower eccentric bush to a maximum eccentric position, in cooperation with the slot; and

upper and lower brake units operated to prevent one or both of the upper and lower eccentric bushes from slipping with respect to one or both of the upper and lower eccentric cams, respectively.

25. A variable capacity rotary compressor including upper and lower compression chambers having different interior capacities thereof, comprising:

a rotating shaft passing through the upper and lower compression chambers and rotatably moving therein;

upper and lower eccentric bushes communicating with the rotating shaft; and

a compensation unit to prevent the upper and lower eccentric bushes from rotating faster than the rotating shaft by compensating for a variance in pressure of one or both of the upper and lower compression chambers as the rotating shaft rotates.